

PENT COOPERATION TREA

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

Date of mailing (day/month/year) 04 December 2000 (04.12.00)	To: Commissioner US Department of Commerce United States Patent and Trademark Office, PCT 2011 South Clark Place Room CP2/5C24 Arlington, VA 22202 ETATS-UNIS D'AMERIQUE in its capacity as elected Office
International application No. PCT/NL00/00227	Applicant's or agent's file reference BO 42487 AS
International filing date (day/month/year) 06 April 2000 (06.04.00)	Priority date (day/month/year) 06 April 1999 (06.04.99)
Applicant KAPAAN, Hendrikus, Jan et al	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

03 November 2000 (03.11.00)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
---	--

09/937,776 PATENT COOPERATION TREATY

PCT

REC'D 21 MAY 2001
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference BO 42487 Web	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NL00/00227	International filing date (day/month/year) 06/04/2000	Priority date (day/month/year) 06/04/1999
International Patent Classification (IPC) or national classification and IPC F16H25/22		
Applicant SKF ENGINEERING & RESEARCH CENTRE B.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 03/11/2000	Date of completion of this report 17.05.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer E.J. Stierman Telephone No. +49 89 2399 8883



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00227

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
Description, pages:

1-5 as originally filed

Claims, No.:

1-15 as received on 06/04/2001 with letter of 06/04/2001

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.: 16-33

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/NL00/00227

the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-15

No: Claims

Inventive step (IS) Yes: Claims 1-15

No: Claims

Industrial applicability (IA) Yes: Claims 1-15

No: Claims

2. Citations and explanations see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL00/00227

Reference is made to the following document:

D1: DE 19736503

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The invention relates to an actuator to convert a rotary movement into a linear translation comprising a housing, a motor, a screw and nut mechanism and a gear reduction mechanism.

A similar actuator is known from D1.

It is an object of the invention to design an actuator with compact dimensions.

This object is according to the characterizing portion of claim 1 solved in that the gear ring of the reduction mechanism is integrated with the screw of the screw and nut mechanism. (In D1 the gear ring of the reduction mechanism is integrally connected to the nut instead of to the screw. Although the invention seems a trivial alternative constructional measure, it cannot be derived from D1 because it would also involve an alternative construction of non-rotatably connecting the nut to the housing.)

Hence, this alternative is neither known from, nor rendered obvious by the available prior art. The subject-matter of claim 1 is therefore new and inventive; claim 1 fulfills the requirements of Article 33 PCT. Claims 2-15 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL00/00227

Re Item VII

Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT. In particular, the embodiment of figure 3 does not form part of the invention.

(75)

Claims

1. Actuator, comprising a housing (1), which contains a motor (2) and a screw mechanism (3), said screw mechanism (3) comprising a screw (16) and a nut (17) one of which is rotatably supported with respect to the housing (1), and a gear reduction mechanism (4) connecting the rotor (7) of the motor (2) to the rotatable screw (16) or nut (17), said gear reduction mechanism (4) comprising at least a concentric gear ring (25) with radially inwardly directed teeth, an excentrically positioned gear wheel (24) having radially outwardly directed teeth wherein the outer diameter of the gear wheel (24) is smaller than the inner diameter of the gear ring (25), such that the teeth of said gear wheel (24) and gear ring (25) engage each other along a part of their circumferences, and at an opposite part of their circumferences are out of engagement, said excentric gear wheel (24) being rotatable accommodated on an excentric hub (23) which is connected to the rotor (7) of the motor (2), characterised in that the gear ring (25) is integrated with the screw (16) of the screw mechanism (3), said screw (16) being rotatably supported with relation to the housing (1).

6a

Claims

1. Actuator, comprising a housing (1), which contains a motor (2) and a screw mechanism (3), said screw mechanism (3) comprising a screw (16) and a nut (17) one of which is rotatably supported with respect to the housing (1), and a gear reduction mechanism (4) connecting the rotor (7) of the motor (2) to the rotatable screw (16) or nut (17), characterized in that the gear reduction mechanism (4) comprises at least a concentric gear ring (25) with radially inwardly directed teeth, an eccentrically positioned gear wheel (24) having radially outwardly directed teeth wherein the outer diameter of the gear wheel (24) is smaller than the inner diameter of the gear ring (25), such that the teeth of said gear wheel (24) and gear ring (25) engage each other along a part of their circumferences, and at an opposite part of their circumferences are out of engagement, said eccentric gear wheel (24) being rotatable accommodated on an eccentric hub (23) which is connected to the rotor (7) of the motor (2).

15

2. Actuator according to claim 1, wherein the gear ring (25) is integrated with the screw (16) of the screw mechanism (3), said screw (16) being rotatably supported with relation to the housing (1).

20

3. Actuator according to claim 1 or 2, wherein the rotor (7) of the motor (2) is rotatably supported on the outer ring (10) of a support bearing (11), said outer ring (10) being integrated with the screw (16) and the gear ring (25).

25

4. Actuator according to claim 3, wherein the rotor (7) by means of a radially inwardly extending flange (21) is connected to the eccentric hub (23).

30

5. Actuator according to claim 4, wherein a positive back-drive mechanism (30) is connected to the flange (21) and the housing (1).

5

6. Actuator according to claim 5, wherein the positive back-drive mechanism is a spiral spring (30).

6

7. Actuator according to any of the preceding claims, wherein the eccentric gear

wheel (24) is rotatably supported with respect to the excentric hub (23) by means of a rolling element bearing (30).

7
8. Actuator according to any of the preceding claims, wherein the motor (2) is
5 an electric motor, the stator (6) of which is connected to the housing (1).

8
9. Actuator according to any of the preceding claims, wherein the gear reduction
mechanism (4) is at the end of the screw mechanism (3) opposite the end thereof
engaging an actuating means (38) for a brake pad (39).

10
9
10. Actuator according to any of the preceding claims, wherein the screw (16) of
the screw mechanism (3) is rotatably supported by means of a support bearing (11)
with respect to a central support shaft (13), the gear ring (23) and the gear wheel (24) of
the reduction gear mechanism (4) surrounding said central support shaft (13).

15
10
11. Actuator according to any of the preceding claims, wherein the screw (16) has
a bore (35) containing a lubricant reservoir (36).

11
12. Actuator according to any of the preceding claims, wherein the gear reduction
mechanism (4) and a positive back-drive mechanism (37) are contained in a gear
reduction module (40).

12
13. Actuator according to any of the preceding claims, wherein the gear reduction
module (40) comprises a central support shaft (13) for supporting the screw mechanism
25 (3).

13
14. Actuator according to any of the preceding claims, wherein the screw
mechanism (3), a support bearing (11) for supporting the screw mechanism (3), the
rotor (7) of the motor (2) as well as a bearing (9) for supporting the rotor (7) on the
30 screw mechanism (3) are contained in a actuator module (41).

14
15. Actuator according to any of the preceding claims, wherein the housing (1),

the stator (6) and electric connections for the motor (2) are contained in a housing module (42).

16. Actuator according to one claim 1, comprising a housing (55), a nut (55) and a screw (56) one of which is axially fixed with respect to the housing (51) and the other of which is axially displaceable with respect to the housing (51) for moving an actuating head (71), as well as a motor (57) which comprises a stator (58) connected to the housing (51), and a rotor which is drivingly connected to a rotatable part (56) of the screw actuator (54), the housing (51) having a bore (60) accommodating at least the nut (55) and/or screw (56), an axially fixed part (55) of said nut (55) or screw (56) being supported with respect to a radial support abutment (61) which extends inwardly in the bore (60), wherein the rotor (59) of the motor (57) supported rotatably on a sleeve (63), said sleeve (63) engaging the fixed part (55) and extending away from the actuating head (71), said sleeve (63) having a radially outwardly extending sleeve flange (64) which is interposed between said support abutment (61), and the axially fixed part (55).

17. Actuator according to claim 16, wherein the flange (54) of the sleeve (63) is supported on an abutment surface (62) of the support abutment (61) which faces an actuating head (71) connected to the axially displaceable nut (55) or screw (56) for exerting a compressive force.

18. Actuator according to claim 16 or 17, wherein the nut (55) is fixedly supported within the housing (51), said nut (55) having a radially outwardly extending nut flange (65) facing the outwardly extending sleeve flange (64) and overlapping the inwardly extending support abutment (61).

19. Actuator according to claim 18, wherein the outwardly facing surfaces of sleeve flange (14) and the nut flange are curved in axial cross section, so as to allow swivelling or tilting of said nut and sleeve due to misalignment forces.

20. Actuator according to claim 18 or 19, wherein the nut (55) has a nut extension (66) extending beyond the nut flange (65) and inside the support abutment (61), the sleeve (63) having an axially extending support part (67) which is accommodated between said nut extension (66) and the support abutment (61).

9

10

31. Actuator according to claim 30, wherein the gear wheel mechanism (4) is connected to a central drive shaft (76) which is rotatably supported in the housing (51) and which extends into a bore (77) in the screw (76), said drive shaft (76) being non-rotatably coupled to the screw (56) through a spline/groove mechanism.

5

32. Actuator according to claim 31, wherein a lubricant dosing module (79) is accommodated in the bore (60) of the screw (66).

15

33. Brake calliper, comprising a claw piece with at least two brakes, and an actuator according to any of the preceding claims.

10

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference BO 42487 AS	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/NL 00/00227	International filing date (day/month/year) 06/04/2000	(Earliest) Priority Date (day/month/year) 06/04/1999
Applicant SKF ENGINEERING & RESEARCH CENTRE B.V. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. **Certain claims were found unsearchable (See Box I).**

3. **Unity of Invention is lacking (see Box II).**

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

1

None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NL 00/00227

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The abstract is modified as follows:

A screw actuator comprises a housing "(1)", a nut "(A)" and a screw "(16)" one of which is axially fixed with respect to the housing and the other of which is axially displaceable with respect to the housing for moving an actuating head, as well as a motor "(2)" which comprises a stator "(6)" connected to the housing, and a rotor "(7)". The rotor "(7)" of the motor is supported rotatably on a sleeve "(8)", said sleeve has an inwardly directed flange "(21)", which carries an eccentric hub "(23)". The eccentric hub "(23)" rotatably supports a gear wheel "(24)" through bearing "(30)", the outer teeth of which gear wheel "(24)" engage the inwardly directed teeth of the ring gear "(25)". The ring gear "(25)" is driving screw "(16)" which is rotatably supported in the housing "(1)". The nut "(17)" of the screw mechanism "(4)" is slidably, but not rotatably with respect to the housing. Through the screwthreads "(18,19)" and balls "(20)", the rotary motion of the screw "(16)" is converted into a linear motion of the nut "(17)", which is contained in a cylinder space "(32)" in the housing "(1)".

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00227

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 F16H25/22 F16D65/21 F16D65/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F16H F16D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 36 503 A (SCHAEFFLER WAEZLAGER OHG) 25 February 1999 (1999-02-25) the whole document	1,2,7-9, 29 12
X	US 2 881 619 A (R.J. FOX ET AL) 14 April 1959 (1959-04-14) column 2, line 15 - line 43; figures 1-3	1,7,8, 29,30
X	US 2 953 934 A (E.V. SUNDT) 27 September 1960 (1960-09-27) column 2, line 40 -column 3, line 72; figures 2-5	1,7,8,29
Y	EP 0 448 515 A (SOCIÉTÉ INDUSTRIELLE DE SONCEBOZ S.A.) 25 September 1991 (1991-09-25) abstract; figure	12

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

13 July 2000

20/07/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Mende, H

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 00/00227

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
DE 19736503	A	25-02-1999		DE 19881217 D		13-07-2000
				WO 9910662 A		04-03-1999
US 2881619	A	14-04-1959		GB 851925 A		
US 2953934	A	27-09-1960		NONE		
EP 448515	A	25-09-1991		NONE		

PATENT COOPERATION TREATY

INGENIEUR 21 MEI 2001

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

JORRITSMA, Ruurd et al
NEDERLANDSCH OCTROOIBUREAU
Postbus 29720
Scheveningseweg 82
NL-2502 LS The Hague
PAYS-BAS

International application report	17-6-01
International filing date (day/month/year)	6-10-01
in reg. nat. fase:	

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing
(day/month/year)

17.05.2001

Applicant's or agent's file reference
BO 42487 Web

IMPORTANT NOTIFICATION

International application No.
PCT/NL00/00227International filing date (day/month/year)
06/04/2000Priority date (day/month/year)
06/04/1999Applicant
SKF ENGINEERING & RESEARCH CENTRE B.V. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Reiff, U

Tel. +49 89 2399-8070



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BO 42487 Web		FOR FURTHER ACTION <small>See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)</small>	
International application No. PCT/NL00/00227	International filing date (day/month/year) 06/04/2000	Priority date (day/month/year) 06/04/1999	
International Patent Classification (IPC) or national classification and IPC F16H25/22			
Applicant SKF ENGINEERING & RESEARCH CENTRE B.V. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 5 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application 			

Date of submission of the demand 03/11/2000	Date of completion of this report 17.05.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer E.J. Stierman Telephone No. +49 89 2399 8883



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00227

I. Basis of the report

1. With regard to the elements of the international application (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)):

Description, pages:

1-5 as originally filed

Claims, No.:

1-15 as received on 06/04/2001 with letter of 06/04/2001

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.: 16-33

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00227

the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c));
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N) Yes: Claims 1-15

No: Claims

Inventive step (IS) Yes: Claims 1-15

No: Claims

Industrial applicability (IA) Yes: Claims 1-15

No: Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL00/00227

Reference is made to the following document:

D1: DE 19736503

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The invention relates to an actuator to convert a rotary movement into a linear translation comprising a housing, a motor, a screw and nut mechanism and a gear reduction mechanism.

A similar actuator is known from D1.

It is an object of the invention to design an actuator with compact dimensions.

This object is according to the characterizing portion of claim 1 solved in that the gear ring of the reduction mechanism is integrated with the screw of the screw and nut mechanism. (In D1 the gear ring of the reduction mechanism is integrally connected to the nut instead of to the screw. Although the invention seems a trivial alternative constructional measure, it cannot be derived from D1 because it would also involve an alternative construction of non-rotatably connecting the nut to the housing.)

Hence, this alternative is neither known from, nor rendered obvious by the available prior art. The subject-matter of claim 1 is therefore new and inventive; claim 1 fulfills the requirements of Article 33 PCT. Claims 2-15 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL00/00227

Re Item VII**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT. In particular, the embodiment of figure 3 does not form part of the invention.

06-04-2001

NL 000000227

EPO - DG 1

06. 04. 2001

6

(75)

Claims

1. Actuator, comprising a housing (1), which contains a motor (2) and a screw mechanism (3), said screw mechanism (3) comprising a screw (16) and a nut (17) one of which is rotatably supported with respect to the housing (1), and a gear reduction mechanism (4) connecting the rotor (7) of the motor (2) to the rotatable screw (16) or nut (17), said gear reduction mechanism (4) comprising at least a concentric gear ring (25) with radially inwardly directed teeth, an eccentrically positioned gear wheel (24) having radially outwardly directed teeth wherein the outer diameter of the gear wheel (24) is smaller than the inner diameter of the gear ring (25), such that the teeth of said gear wheel (24) and gear ring (25) engage each other along a part of their circumferences, and at an opposite part of their circumferences are out of engagement, said eccentric gear wheel (24) being rotatable accommodated on an eccentric hub (23) which is connected to the rotor (7) of the motor (2), characterised in that the gear ring (25) is integrated with the screw (16) of the screw mechanism (3), said screw (16) being rotatably supported with relation to the housing (1).

Q6-04-2001

NL 000000227

6a

Claims

1. Actuator, comprising a housing (1), which contains a motor (2) and a screw mechanism (3), said screw mechanism (3) comprising a screw (16) and a nut (17) one of which is rotatably supported with respect to the housing (1), and a gear reduction mechanism (4) connecting the rotor (7) of the motor (2) to the rotatable screw (16) or nut (17), characterized in that the gear reduction mechanism (4) comprises at least a concentric gear ring (25) with radially inwardly directed teeth, an excentrically positioned gear wheel (24) having radially outwardly directed teeth wherein the outer diameter of the gear wheel (24) is smaller than the inner diameter of the gear ring (25), such that the teeth of said gear wheel (24) and gear ring (25) engage each other along a part of their circumferences, and at an opposite part of their circumferences are out of engagement, said excentric gear wheel (24) being rotatable accommodated on an excentric hub (23) which is connected to the rotor (7) of the motor (2).

15 2. Actuator according to claim 1, wherein the gear ring (25) is integrated with the screw (16) of the screw mechanism (3), said screw (16) being rotatably supported with relation to the housing (1).

20 3. Actuator according to claim 1 ~~or 4~~, wherein the rotor (7) of the motor (2) is rotatably supported on the outer ring (10) of a support bearing (11), said outer ring (10) being integrated with the screw (16) and the gear ring (25).

25 4. Actuator according to claim 3, wherein the rotor (7) by means of a radially inwardly extending flange (21) is connected to the excentric hub (23).

30 5. Actuator according to claim 4, wherein a positive back-drive mechanism (30) is connected to the flange (21) and the housing (1).

6. Actuator according to claim 5, wherein the positive back-drive mechanism is a spiral spring (30).

7. Actuator according to any of the preceding claims, wherein the excentric gear

06-04-2001

7

wheel (24) is rotatably supported with respect to the eccentric hub (23) by means of a rolling element bearing (30).

7 8. Actuator according to any of the preceding claims, wherein the motor (2) is an electric motor, the stator (6) of which is connected to the housing (1).

8 9. Actuator according to any of the preceding claims, wherein the gear reduction mechanism (4) is at the end of the screw mechanism (3) opposite the end thereof engaging an actuating means (38) for a brake pad (39).

10 10. Actuator according to any of the preceding claims, wherein the screw (16) of the screw mechanism (3) is rotatably supported by means of a support bearing (11) with respect to a central support shaft (13), the gear ring (23) and the gear wheel (24) of the reduction gear mechanism (4) surrounding said central support shaft (13).

15 11 11. Actuator according to any of the preceding claims, wherein the screw (16) has a bore (35) containing a lubricant reservoir (36).

20 12 12. Actuator according to any of the preceding claims, wherein the gear reduction mechanism (4) and a positive back-drive mechanism (37) are contained in a gear reduction module (40).

25 13 13. Actuator according to any of the preceding claims, wherein the gear reduction module (40) comprises a central support shaft (13) for supporting the screw mechanism (3).

30 14 14. Actuator according to any of the preceding claims, wherein the screw mechanism (3), a support bearing (11) for supporting the screw mechanism (3), the rotor (7) of the motor (2) as well as a bearing (9) for supporting the rotor (7) on the screw mechanism (3) are contained in a actuator module (41).

15 15. Actuator according to any of the preceding claims, wherein the housing (1),

06-04-2001

the stator (6) and electric connections for the motor (2) are contained in a housing module (42).

16. Actuator according to one claim 1, comprising a housing (55), a nut (55) and a screw (56) one of which is axially fixed with respect to the housing (51) and the other of which is axially displaceable with respect to the housing (51) for moving an actuating head (71), as well as a motor (57) which comprises a stator (58) connected to the housing (51), and a rotor which is drivingly connected to a rotatable part (56) of the housing (51), the housing (51) having a bore (60) accommodating at least the nut screw actuator (54), 5 10 15 16 17 18 19 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 3220 3225 3230 3235 3240 3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 4245 4250 4255 4260 4265 4270 4275 4280 4285 4290 4295 4300 4305 4310 4315 4320 4325 4330 4335 4340 4345 4350 4355 4360 4365 4370 4375 4380 4385 4390 4395 4400 4405 4410 4415 4420 4425 4430 4435 4440 4445 4450 4455 4460 4465 4470 4475 4480 4485 4490 4495 4500 4505 4510 4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600 4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700 4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800 4805 4810 4815 4820 4825 4830 4835 4840 4845 4850 4855 4860 4865 4870 4875 4880 4885 4890 4895 4900 4905 4910 4915 4920 4925 4930 4935 4940 4945 4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340 5345 5350 5355 5360 5365 5370 5375 5380 5385 5390 5395 5400 5405 5410 5415 5420 5425 5430 5435 5440 5445 5450 5455 5460 5465 5470 5475 5480 5485 5490 5495 5500 5505 5510 5515 5520 5525 5530 5535 5540 5545 5550 5555 5560 5565 5570 5

06-04-2001

NL 000000227

9
10

31. Actuator according to claim 30, wherein the gear wheel mechanism (4) is connected to a central drive shaft (76) which is rotatably supported in the housing (51) and which extends into a bore (77) in the screw (76), said drive shaft (76) being non-rotatably coupled to the screw (56) through a spline/groove mechanism.

5

32. Actuator according to claim 31, wherein a lubricant dosing module (79) is accommodated in the bore (60) of the screw (66).

15

33. Brake calliper, comprising a claw piece with at least two brakes, and an actuator according to any of the preceding claims.

OLIFF & BERRIDGE, PLC

ATTORNEYS AT LAW

277 SOUTH WASHINGTON STREET, SUITE 500
ALEXANDRIA, VIRGINIA 22314TELEPHONE: (703) 836-6400
FACSIMILE: (703) 836-2787E-MAIL: COMMCENTER@OLIFF.COM
WWW.OLIFF.COM**FACSIMILE TRANSMISSION COVER SHEET**

November 29, 2001

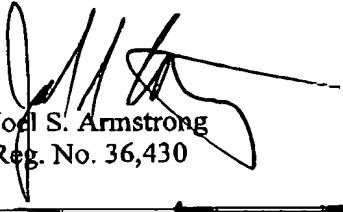
To: Ms. Francine Young
U.S. Patent and Trademark Office

703-305-3230

From: Joel S. ArmstrongYour Ref.: 09/937,776 Our Ref.: 110748Number of Pages Sent (Including cover sheet): 12Prepared By: JSA**Comments:**

Ms. Young,

Further to your request, attached is a copy of the International Preliminary Examination Report. Please let me know if you have any further questions.


Joel S. Armstrong
Reg. No. 36,430Sent by: JSA

This facsimile is intended only for the use of the individual or entity named above and may contain privileged or confidential information. If you are not the intended recipient, or the employee or agent responsible to deliver it to the intended recipient, you are notified that any review, dissemination, distribution or copying of this facsimile is prohibited. If you have received this facsimile in error, please immediately notify us by facsimile or telephone, and return the facsimile to us by mail at the above address.

*** RX REPORT ***

RECEPTION OK

TX/RX NO	8356
CONNECTION TEL	703 836 2787
SUBADDRESS	
CONNECTION ID	OLIFF & BERRIDGE
ST. TIME	11/29 16:10
USAGE T	03 '28
PGS.	12
RESULT	OK



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : F16H 25/22, F16D 65/21, 65/16		A1	(11) International Publication Number: WO 00/60255
			(43) International Publication Date: 12 October 2000 (12.10.00)
(21) International Application Number: PCT/NL00/00227		(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 6 April 2000 (06.04.00)			
(30) Priority Data: 1011731 6 April 1999 (06.04.99) NL			
(71) Applicant (for all designated States except US): SKF ENGINEERING & RESEARCH CENTRE B.V. [NL/NL]; P.O. Box 2350, NL-3430 DT Nieuwegein (NL).			
(72) Inventors; and			
(75) Inventors/Applicants (for US only): KAPAAN, Hendrikus, Jan [NL/NL]; Waterhoen 5, NL-3435 DM Nieuwegein (NL). ZWARTS, Jacobus [NL/NL]; Carmenlaan 5, NL-3438 VA Nieuwegein (NL). BROERSEN, Simon, Jan [NL/NL]; Lichtegaarde 41, NL-3436 ZS Nieuwegein (NL).			
(74) Agent: JORRITSMA, Ruurd; Nederlandsch Octrooibureau, Scheveningseweg 82, P.O. Box 29720, NL-2502 LS The Hague (NL).			
(54) Title: ACTUATOR HAVING COMPACT GEAR REDUCTION			
(57) Abstract			
<p>A screw actuator comprises a housing (1), a nut (A) and a screw (16) one of which is axially fixed with respect to the housing and the other of which is axially displaceable with respect to the housing for moving an actuating head, as well as a motor (2) which comprises a stator (6) connected to the housing, and a rotor (7). The rotor (7) of the motor is supported rotatably on a sleeve (8), said sleeve has an inwardly directed flange (21), which carries an eccentric hub (23). The eccentric hub (23) rotatably supports a gear wheel (24) through bearing (30), the outer teeth of which gear wheel (24) engage the inwardly directed teeth of the ring gear (25). The ring gear (25) is driving screw (16) which is rotatably supported in the housing (1). The nut (17) of the screw mechanism (4) is slidably, but not rotatably with respect to the housing. Through the screwthreads (18, 19) and balls (20), the rotary motion of the screw (16) is converted into a linear motion of the nut (17), which is contained in a cylinder space (32) in the housing (1).</p>			

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Amenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	CN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00227

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 F16H25/22 F16D65/21 F16D65/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 F16H F16D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 36 503 A (SCHAEFFLER WAEZLAGER OHG) 25 February 1999 (1999-02-25) the whole document	1, 2, 7-9, 29 12
X	US 2 881 619 A (R.J. FOX ET AL) 14 April 1959 (1959-04-14) column 2, line 15 - line 43; figures 1-3	1, 7, 8, 29, 30
X	US 2 953 934 A (E.V. SUNDT) 27 September 1960 (1960-09-27) column 2, line 40 -column 3, line 72; figures 2-5	1, 7, 8, 29
Y	EP 0 448 515 A (SOCIÉTÉ INDUSTRIELLE DE SONCEBOZ S.A.) 25 September 1991 (1991-09-25) abstract; figure	12

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

13 July 2000

Date of mailing of the international search report

20/07/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Mende, H

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 00/00227

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19736503 A	25-02-1999	DE 19881217 D WO 9910662 A	13-07-2000 04-03-1999
US 2881619 A	14-04-1959	GB 851925 A	
US 2953934 A	27-09-1960	NONE	
EP 448515 A	25-09-1991	NONE	